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CHINA: GEOGRAPHY AND RESOURCES

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The ultimate greatness of a nation as a political power depends primarily upon its geographical position and its physical resources. Those qualities of racial character that we are apt to think of as the basis of a people's progress, are, in the last analysis, largely determined by physical surroundings; and even a progressive people in a land of scanty resources or of unfavorable geographic position could not hope to attain and maintain the highest stage of national greatness.

What are the actual facts as to the geography of China that justify the current belief that this nation is destined to become a power of the first magnitude? that here in eastern Asia will continue to be enacted some of the greatest and most far-reaching events in national and international affairs? What are its actual resources that give credence to the belief that here the wealth of the world is to be enormously increased? that here will develop a trade and commerce sufficient to bring fortunes to the individuals or the nations that can control it? Be his interests economic, commercial or political, these are questions that should receive first consideration by the student of the Far East.

The Chinese Empire consists of China proper and her four dependencies—Tibet, Eastern Turkestan, Mongolia and Manchuria. China, however, although it has but one-third of the area of the Empire, contains practically all its wealth and population. This article is confined to China itself, referring only indirectly to the dependencies.

I. *Geographical Position*

Isolation.—The fact of greatest influence on China's history is its almost complete separation from the rest of the world, by land and by sea. It is this fact that has made possible the maintenance of its civilization, almost unchanged for over 2,500 years. China faces the Pacific, the largest of the oceans, across whose waters the

small boats of the Chinese could not hope to cross. And even had they crossed, they would have found the distant shores almost uninhabited. On the shore of this ocean there was no other nation, either in the old world or the new, save the small island Empire of Japan, with its kindred people and civilization, which could penetrate to China by sea, bringing new peoples and new thoughts. Chinese influence upon Japan's development was strong, but, until within the last two decades, Japan has had little influence upon the huge Empire of the Chinese.

India, on the Indian Ocean, possessed a great population and an ancient civilization, but the sea voyage even to India was long and stormy, and the way infested by pirates who found ready shelter in numerous islands and bays. The distance from Canton to Calcutta is over 3,500 miles, further than from Philadelphia to Liverpool, so that even with this one other populous section in Asia intercourse was difficult.

As for sea connections with European nations, the way was absolutely unknown until 1498, and the great distance even then shut out Western invasion, save in a very small way, until well on in the nineteenth century. By sea China has been all but completely isolated from the rest of the civilized world.

By land, China is likewise all but barred out from intercourse with the remainder of Asia and with Europe by a system of high mountain ranges, broad plateaus, and sandy desert wastes unrivaled as a land barrier anywhere else on the earth's surface. From the China Sea this triple barrier of mountain, sand and plateau encloses China in a great curve, over 6,000 miles in extent, passing through Indo-China to Central Asia and on through eastern Siberia to the Ckhotsk Sea. The outer edge of this curve consists of the highest and most inaccessible of mountain ranges, the Himalayas, the Pamirs, the Tian-shan, the Altai, the Yablonovyi. From the southern province of Yun-nan to the Dzungaria pass in central Asia, a distance of about 2,800 miles, the lowest passes are over 10,000 feet and many reach 16,000 to 18,000 feet. The lowest passes in the mountains between Burma and southern China are from 5,000 to 7,000 feet in altitude and narrow and difficult. North of the Pamirs the general east-west extension of the mountain ranges gives lower and somewhat easier passes into western Asia. The wide pass of Dzungaria, north of the Tien

Shan Range, has an elevation as low as 5,000 to 6,000 feet. Northeast from this opening, other passes from 5,000 to 8,000 feet in altitude are found leading to Siberia.

The inside of this high mountainous curve is occupied by broad, high, desert plateaus, from 1,500 to 2,000 miles in width, and ranging in height from 9,000 to 18,000 feet in Tibet to 3,000 to 5,000 in the plateau of Mongolia, and crossed by higher mountain ranges. These plateaus are occupied by the Chinese dependencies of Tibet, Eastern Turkestan and Mongolia, buffer states over which China has maintained control as a still greater protection from western invasion. Even without the outer encircling ranges of mountains, this desert plateau in itself would be sufficient to shut out any but the most desultory communications.

Isolation—Present Significance.—The all but complete isolation made by the natural boundaries of China as just indicated have been partly removed in recent times by improvements in transportation. The cutting of the Suez Canal has greatly shortened the route from Europe, and the opening of the Panama Canal will bring eastern America somewhat nearer. The steamship and the railroad have shortened the time of journey by many days, or even weeks, and have brought the products, the peoples, and the ideas of every land to China's doors. China is no longer completely cut off from outside influences. But yet her position far distant from Europe and the Americas and her mountain and desert boundaries, will long continue to exert a great influence upon Chinese affairs and Chinese progress.

In spite of transportation improvements, Shanghai is still forty-five days by sea from western Europe and fourteen days from western North America. In the peaceful pursuits of commerce, although the sea is a connecting highway, these great distances offer barriers to trade in increased freight rates, both for imports and exports, as well as in length of time required for transport. The expense of travel limits both the number of foreign visitors to China and Chinese visitors to foreign countries, thus cutting off one means of acquiring new ideas and progressive methods. This separation may in time prove of benefit to Chinese far eastern trade, in that it will encourage the growth of manufacturing industries in China. When she learns to use her resources of mechanical power and of cheap and efficient labor in manufacturing, the long dis-

tance away of her competitors will be to their disadvantage and to China's gain.

In war, even in modern times, the sea is a most effective barrier. It is true that China presents 2,100 miles of seacoast open to attack from foreign navies. But these navies, when in Chinese waters, are far from their bases of supplies. In the event of a war of conquest, involving the transportation of large armies, the thousands of miles of sea between China and the great powers of Europe will prove scarcely less effective as a protection than they have in the past.

"It is this limited capacity of navies to extend coercive force inland that has commanded them to the highest political intelligence as a military instrument mighty for defence, but presenting no menace to the liberties of a people."¹

In peace and war, the land barriers must always remain effective. Great Britain in the south and Russia on the north have extended their dominions to the mountain circle that forms the outer bulwark of China's natural defences; and here they have stopped. Not only do the high mountains and plateaus oppose further conquest, but the desert lands are hardly worth the taking. Yet it is almost certain had not the mountains intervened, those two powers would have extended before this their borders to, if not within, China itself. This, in fact, is what Russia nearly accomplished in the only weak point in the mountain barrier, namely Manchuria.

Manchuria alone, of all the land boundaries of China, can be regarded as at all open. The Manchurian plain, rich and fertile, opens readily into northern China and the mountain divide separating Manchuria from Siberia is relatively low and easy of passage. It is from this direction that Russia has stretched forth her conquering arm, taking possession of all the northern half of the Amur valley and reaching down the Pacific coast to Korea. She was finally entrenching herself in all of Manchuria when forced to loosen her hold by Japan. Here alone, by means of the Siberian Railway, is China directly connected by land with Europe, and here has her territorial integrity been most threatened. The retention of Manchuria by China is a vital necessity to maintain protection along her land frontier.

¹ Mahan, A. T., "The Problem of Asia," p. 42

Except for the Siberian Railway, the mountain-desert barrier has kept from China any international railways.² In Burma and India many roads reach up to the base of the Himalayas, while in Turkestan the Russians have penetrated to the Pamirs with their railroad lines, but none have yet crossed. Both the lack of resources in the central Asiatic plateaus and difficulty of construction over these high ranges will undoubtedly long prevent any such extension.

Accessibility—Seacoast and Harbors.—The preceding section has emphasized China's isolation and its effects both past and present. Turning to the other side of the question, to what extent do physical features make China accessible to modern trade and commerce?

The prime requisite for the growth of a modern nation is ready access to the sea. China's seacoast extends over 2,000 miles, following the main outlines of the coast; or, including the minor depressions, over 4,500 miles. But this long seacoast presents but comparatively few good harbors. Remarkably free from deep indentations, it encloses all of eastern China in a single great curve, convex to the east, and broken only where the Shan-tung peninsula projects eastward toward Korea in the north, and the Lei Chau peninsula reaches toward the island of Heinan in the south. These projecting peninsulas form the only large inclosed bays along the China coast, the Gulf of Pe-chi-li and the Gulf of Tongking. The largest depression in this great curve is Hang-chow Bay, at its most eastern edge. And this bay is but sixty miles wide, extends inland about the same distance, and is too shallow for large ocean-going vessels.

The northern coast, north of Hang-chow is especially deficient in harbors. Except for the Shan-tung peninsula, it is made up of alluvial material brought down by the two great rivers of China, and has, therefore, a low, flat, swampy shore, straight and regular and gradually advancing seaward. Off shore it is very shallow and filled with shifting sand bars. Ten miles off the coast of Chi-li water is but twenty feet deep, and, moreover, is obstructed by ice during the winter months. There are no harbors worthy the name on the Gulf of Pe-chi-li nor along the coast south of the Shan-tung promontory. Shanghai is situated on the Wang-poo River, a short

² A short line from Hanoi in Annam into the province of Yun-nan, is an international railway, but it does not cross the mountain barrier.

tidal tributary near the mouth of the Yangtze. The Yangtze enters the sea in a great estuary sixty miles wide, but filled with islands and shifting channels, and constantly threatening to silt up the entrance to Shanghai whose connection with the sea is maintained by artificial means. Passengers and cargo sometimes have to be unloaded at the Woosung Bar, at the mouth of the river, and taken by barges fifty miles up to Shanghai. Its existence as a great port is due entirely to its position at the mouth of a great navigable river. It is the only port in China that has good natural access to the interior.

The Shan-tung peninsula only, in all of the northern coast of China, has a few good natural harbors, due to the fact that here the mountains reach the sinking seacoast forming a series of bays and protecting headlands, but these harbors have no natural connections to the interior. The two best have been taken possession of by foreign powers. Wei-hai-wei, a large protected harbor with a depth of forty-five feet, was leased by Great Britain in 1898, and Ts'ingtao, on Kiaw-chau Bay, one of the largest and best harbors in the East, was taken by Germany in the same year. The Chinese treaty port of Che-foo possesses a large and deep harbor.

South of Hang-chow Bay, the coast, like Shan-tung, is formed by the depression of a mountainous region and possesses several good natural harbors, but, also like Shan-tung, they have poor access to the interior. Foo-chow, Amoy, Swatow, Hong Kong, and Kwang-chow-wan are all good harbors, capable of receiving the largest ocean vessels. Canton cannot receive ships of over ten feet draught, while Macao is fast silting up.

Navigable Streams.—Not only is China's coast free from deep indentations that allow penetration of the sea inland, but its rivers, with the notable exception of the Yangtze, are unnavigable by ocean-going vessels except in their lower courses. The mighty Hwang-ho is used only by junks, even in its lowest courses, due to bars at its mouth and sands in its channels. Above its entrance to the highlands, it is unnavigable even for junks.

The Si-Kiang in the south is navigable only to Wu-chow for vessels of less than six and one-half feet draught, a distance of about 125 miles. Small boats and barges, however, can go far up its main stream as well as its tributaries.

It is the Yangtze that opens the interior of China to the sea.

Ocean-going vessels drawing sixteen to eighteen feet of water come to the wharves at Han-kow, 680 miles from the ocean, into the very heart of China. River steamers can proceed 370 miles further, to Ichang where the gorges of the Yangtze seriously hinder navigation. These gorges are navigated, however, with difficulty by large junks to Chang-king (400 miles), and small junks go on even to Ping-shan, 1,750 miles from the mouth. A small, specially-constructed steamboat now makes regular trips from Ichang to Chang-king through the gorges. Small steamers navigate the Han for three hundred miles northwest from Han-kow. Even in the Yangtze navigation by the large ocean going vessels is prevented in the dry winter season, when not over six feet draught boats can be taken up the river. At all seasons, shifting sand bars are a serious evil. But in spite of these handicaps, the Yangtze is the chief natural instrument for making the interior of China accessible to the outside world. Here commerce and industry are gaining firmest foothold. The fact that the present revolutionary movement has had its origin in the Yangtze Valley and has here gained its strongest support is significant of the openness of this central valley to outside influences.

Accessibility by Land.—In the description of China's land boundaries their isolating effects were noted. But in spite of these effective barriers China has long continued to hold some intercourse with the rest of Asia. Immigrations from the West were the beginnings of her civilization; her religion has come from India, as witnessed by the Buddha worship; Christian missionaries from Europe established the church in China in the middle ages; Chinese goods found their way to Europe in very early times; and some degree of commerce is still maintained across the deserts and mountains.

The early peoples bringing Chinese civilization undoubtedly came from western Asia, passing along the Tarim Basin or through the Dzungaria pass north of the Tian Shan, thence along the northern edge of the Nan Shan to the valleys of the Wei-Ho and the Hwang-Ho. This is the easiest of the routes between the East and West and has long been the line of a small caravan trade. It is very long, however, the distance from Kan-su province to the plains of Turkestan being 2,500 to 3,000 miles and it traverses a high, cold, desert region.

From Pekin northward a long but easy pass leads through Kalgan to the Mongolian plateau, 5,000 feet above sea level; and followed now by the recently completed railroad to Kalgan. Here begin two long caravan routes to Siberia, one leading to the Lake Baikal district, crossing the high desert; the other, after crossing a rough and sandy region for more than a thousand miles, passes north of the Altai mountains and reaches the headwaters of the Irtysh River in Siberia through a snow-covered pass 8,000 feet high.

Connection with Tibet and Burma in the southwest is maintained through very high and difficult passes. From Cheng-tu, the capital of Sze-chuan, a trade route leads to Lhasa in Tibet over three mountain passes, up to 10,000 feet in height; and from Kan-su province, a still more difficult route reaches the same destination over passes as high as 16,000 feet. From Lhasa a high, but not so difficult, way leads into India.

Between Yun-nan and Burma a high and deeply dissected plateau, fever-infested, makes progress very difficult. The valleys are cut in this plateau from 3,000 to 4,000 feet below the general level of the region and extend north and south across the line of travel, but a trade route, possible only for pack-laden coolies, crosses from Yun-nan to the Irawadi, in Burma. In Burma, a railroad now extends toward China for 150 miles northeast of Mandalay, and it has been proposed that this line be extended connecting Yun-nan with Burma. The physical difficulties in the way of such a road, while probably not insurmountable, are exceedingly great, and would involve an enormous expenditure. The construction of such a railroad is probably very far in the future. The only way that these highlands of southwest China are less effective than the rest of the land barriers lies in the fact that they are narrower and a trade route here would connect the two most densely populated regions of Asia and furnish an outlet of China's wealth into Indian ports. But even modern engineering skill hesitates to assume the task that would be involved in constructing a railroad on this high and deeply dissected plateau. Political reasons only, if any, will have weight in bringing about its construction.

II. Physical Features and Resources

Surface Form—Mountains.—China is essentially a mountainous country, rough, rugged and high. It consists for the most part

of ancient crystalline and sedimentary rocks that have been faulted, folded and worn down by the forces of erosion, only to be again uplifted or deformed and dissected by the streams into valleys, deep, steep-sided and narrow. Only where recent deposits of wind- or water-borne silt have filled up the irregularities of the surface are level areas to be found, as in the loess-filled valleys of the northern provinces or in the delta deposits at the mouths of the rivers. Less than one-fifth of the area of China is under 1,000 ft. in altitude, and most of this is in the great delta plains of the east and north-east. The average elevation is estimated at 1,500 ft., as compared to 500 ft. for the United States, and 300 ft. for Great Britain.

The northern and western edges of China are in the high plateaus and mountains of central Asia. Two-thirds of the great province of Sze-chuan comprises the inaccessible mountains, bordering on Tibet, and reaches altitudes of from 10,000 to over 16,000 ft. Much of Yun-nan and Kan-su are likewise situated, while the northern portions of all the northern provinces lie on the high edge of the Mongolian plateau.

The descent from these highest plateaus to the south and east is often abrupt, the line of separation being in many cases great fault escarpments. But instead of leading down to low plains the descent generally is to a rugged plateau and mountainous region, from 1,500 to 6,000 feet in height, which covers the remainder of the area of China to the very ocean's edge, except where interrupted by the delta plains of the Hwang-ho and Yangtze.

Plains.—The Great Plain of the northeast, forming a great half circle with the Shan-tung peninsula at its center, and the extensive flood plains of the lower Yangtze constitute the only large plain areas in China. Though large in themselves, these plains occupy scarcely one-eighth of China's surface. Elsewhere only narrow flood plains or small deltas relieve the usual monotony of slope and mountain ridge. The northern or Great Plain consists for the most part of the fertile Hwang-ho delta, reaching inland for 400 miles. North of this delta the plain is of marine origin, covered with alluvium from the mountain streams. The Yangtze plains extend inland in a series of silt-filled basins for 600 miles, separated from each other and from the northern Great Plain by ranges of hills and mountains. These two plains coalesce, however, in the east, so that a continuous wide plain extends from

Hang-chow to Peking, a distance of about 750 miles. Ichang, at the head of the Yangtze plains, 1,000 miles up the river, is but 130 feet above sea-level.

Low and flat, these plains are covered with many large lakes and swamps. The rivers, flowing across them in beds higher than the level of the plains, are held in by great embankments, sixty feet high in places, but subject to frequent overflows in time of flood that cause enormous losses to life and property. But the soil is rich and inexhaustible, the surface easily tilled and well watered and capable of yielding enormous crops. These extensive plains, equal in area to the combined states of Ohio, Indiana, Illinois, and Kentucky, constitute the great agricultural resource of China. They now support an enormous population, fully forty per cent of China's total, though constituting but one-eighth of its area, and furnish foods and raw materials for export. Control of the devastating flows would enormously increase their wealth-producing ability.

Climate.—Although occupying a latitude corresponding to that between New York and Santiago de Cuba, China has a climate with a lower average temperature and greater seasonal extremes than are found in these same latitudes in America. High altitude, combined with close proximity to the extensive high plateaus of central Asia, with their great extremes of heat and cold, largely account for these conditions. Frosts occur in practically all parts of China, and snow occasionally falls even in Canton, within the tropics. Everywhere there is a distinct change from summer to winter, much less marked in the central and southern provinces, which are without great temperature extremes, but very decided in the north, where the winters are long and severe and the summers warm.

Under the influence of the monsoons China has an abundant summer rainfall. Although decreasing in amount in the west and north, no section has less than twenty inches of annual rain, most of which falls during the growing season, when it is of greatest benefit to agriculture.

Geographic Divisions.—China may be conveniently divided, for purposes of regional study, into three divisions—northern, central and southern China—partly on the basis of physical features, partly because of climatic differences. Northern China is occupied by the

drainage basin of the Hwang-ho, and is separated from central China by the high and inaccessible Tien-shan in the west, and the lower mountains which continue the divide eastward nearly to the coast. Central China corresponds in general to the basin of the Yangtze, while southern China occupies the wide, mountainous plateau that stretches in a wide belt across all of southern China, and which is drained in its northern part by the Si Kiang. Many intersecting mountain ridges divide all these divisions into smaller, well-defined sub-divisions.

Northern China.—The western and northern parts of this section consist of high plateaus, sloping south and east and crossed by deep gorges. In a great semi-circle around the base of the plateau rise the mountains of southern Shen-si and eastern Shan-si, in a northward and westward facing fault escarpment over 4,000 feet high, inclosing the basins of the Wei-Ho and Fon-Ho, and forming a barrier of the first magnitude to the descent from the high plateau. This barrier is broken through only by the Hwang-Ho when it abruptly turns to the east in a narrow, unnavigable gorge that offers very limited connection between the interior valley of the Wei-Ho and the Great Plain. East of these mountains extends the Great Plain, followed by, and partially surrounding, the dissected mountain mass of Shan-tung.

In spite of this variety in surface form, northern China possesses many features in common. It is distinct from the rest of the country in climate, soil, agricultural productions and people.

Climate.—In this northern section are the greatest extremes in temperature to be found in China, less marked in the Shan-tung region, most decided in the extreme north and west. Winters are cold, rivers are frozen over for several weeks, cold west gales sweep over the plains, and agricultural activities cease. Temperatures of 5 degrees below zero (F.) have been recorded in Peking, while the January mean is 23 degrees. The summers, however, are warm, the July average being 79 degrees, with recorded extremes of 105 degrees. But the rains are less than in central and southern China. The annual rainfall of the Shan-tung peninsula and of Peking is about 24 inches. The northern provinces are in the boundary zone separating the humid monsoon regions from the arid interior, and a slight decrease in the annual rainfall or delay in the coming of the summer monsoons, may bring failure in crops and famine.

These crop failures in the western province seem to be increasing in number and severity, due in part, at least, to the fact that the mountains, completely deprived of their forest covering, are no longer able to hold the moisture. The mountains are characteristically bare, brown and gashed with soil-destroying gullies.

Soil.—The most important resource of this northern basin is the loess soils, known to the Chinese as "Hwang-tu," or "yellow earth." Loess deposits occupy most of the Great Plain of eastern China, but in the mountains it occurs for the most part only in valleys or isolated basins. Sometimes it is found high up on the mountains.

Sorted and transported repeatedly and alternately by winds and waters, the material (the rock-waste from which loess is formed) came to consist in great part of fine dust, the loess, which both agents could carry in largest amount; but this was always mingled, as it is now, with some coarser sand and gravel introduced by flood waters. Beyond desert basins, the path along which the Huang-tu was distributed was chiefly down the valleys of a previous physiographic epoch, as it is now down the valleys of the present far more mountainous surface. It was deposited on flood-plains and in lake basins. The lighter portions of it were blown out onto mountain slopes and gathered beneath wind eddies or in sheltered hollows. In course of distribution it became thoroughly decomposed and oxidized; and where it accumulated and was exposed to subaerial conditions it acquired vertical cleavage, a secondary characteristic due to gravity and movement of ground waters, and became charged with salts brought in by such waters. The process of transportation and accumulation are in progress now and are believed to have been similar in past ages.³

Streams and roads have often cut deeply into the thick loess deposits, and, bare of forests, it is being rapidly carried away by the forces of erosion. Original level surfaces are, therefore, now often rugged, and not easily tilled.

Its indestructible fertility is dependent upon a sufficient water supply, and its surface being above the level of the streams is incapable of irrigation. With increasing forest destruction and possible decrease in rainfall, crop failures and famines have become more common, even in the loess-covered provinces.⁴

Agriculture.—Agriculture is largely restricted in the mountainous sections to isolated loess-filled basins. The Wei-ho and Fon-Ho valleys are rich in agricultural resources and support a dense popu-

³ Willis, Bailey. "Research in China," pp. 184-5.

⁴ Little, A. "The Far East," p. 26.

lation, but it is the Great Plain, with its loess-covered soils, level surface and summer rains, that forms the chief crop-growing region. Most of the mountain provinces can barely supply the needs of their own people, and are thinly populated, but the Great Plain has food to spare beyond the needs of its own exceedingly dense population.

Lower temperatures and rainfall give northern China a distinct type of agricultural productions. Rice is not grown to any extent north of the dividing ranges. Some is grown in the milder and moister southern Shan-tung province and northern Kiang-su, but it is not the staple crop. The chief food crops are barley, wheat, millet, maize, peas, beans and fruit. Opium is extensively grown in all the provinces, but especially in the mountainous ones of the north and west, where, because of the ease of marketing a crop of high value and little bulk it serves the most satisfactory money crop for the isolated mountain-valley farmers. It answers the same purpose that whisky did in the early days in western Pennsylvania.⁵ Cotton, hemp and tobacco are grown to a considerable extent, and, especially in the eastern provinces, silk. Considerable grazing is carried on in the mountains of Shan-tung and Chi-li.

Short seasons restrict agriculture to one crop per year in most of northern China. In a limited area of the Wei valley two crops are grown, and also in the extreme southern part of the Great Plain.

People.—The isolated position of Shen-si, Kan-su and Shan-si largely accounts for the strong anti-foreign spirit of their peoples: their conservatism, ignorance and fanaticism. The Boxer troubles of 1900 had their strongest support in these provinces, and here the outrages against foreigners were most marked. Here at Si-nan, in the isolated valley of the Wei, the Imperial court sought refuge. In the present revolution outrages against foreigners have been frequently reported from here, while in other sections there has been comparatively little molestation of strangers.

The people of northern China are larger and more sturdy and robust than the people of the south. This is largely due, probably, to the frequent invasions of the sturdier northern races into this section, and their absorption by the Chinese. But the dry, cool and invigorating climate has undoubtedly also contributed to this superior physical robustness.

⁵ Ross, E. A. "The Changing Chinese," p. 150.

The early civilization of China was long confined to this region, after entering the valley of the Wei. The mountain borders on the south prevented migration in that direction, and the fertile soils of Shan-si and the Great Plain drew them to the east. Crossing the plain to the higher peninsula of Shan-tung, with its many fertile valleys and mild and more equable climate, the growing race here "attained its highest development, and produced, in the seventh and sixth centuries before our era a school of philosophers worthy to rank with their contemporaries in the West—in India and in Greece."⁶

Central China. The Yangtze Valley.—The southern boundary of this division is not well defined. Many of the southern tributaries of the Yangtze penetrate far into the plateau of southern China, while in the west, in Yun-nan, this plateau is crossed by the Yangtze itself.

The Yangtze Valley is often compared to the Mississippi. The comparison holds to only a limited extent, and fails in many important particulars. Both in length and volume of water the two rivers are comparable, both open up the heart of a great country, both present many of the same problems of control and navigation. But while the Mississippi River and its tributaries flow practically throughout their whole extent across great plains, the Yangtze flows across mountains and plateaus, and two-thirds of its course is in deep gorges, in which the valley is scarcely wider than the stream bed.⁷

Leaving the high plateaus, the Yangtze flows in a deep gorge along the southern edge of the Red Basin, and not until it leaves the gorges at Ichang, at the beginning of the lower third of its course, does it enter a valley plain, and this plain is comparatively narrow, and hemmed in by mountains. It consists of three silt-filled basins, together with the present delta, swamp and lake covered, and subject to destructive floods. Although covering a somewhat larger area, these plains are comparable only to the Mississippi flood plain and delta.

The Mississippi Valley occupies a single great plain in which communication is easy by land as well as by water, and in which no section is separated by natural barriers from other sections. The

⁶ Little, A. "The Far East," p. 23.

⁷ *Ibid.*, p. 57.

Yangtze Valley is divided into three main divisions, separated from each other by effective barriers: 1. The alluvial plains, occupying the lower course of the river. 2. The Red Basin, separated by difficultly crossed mountains from the alluvial plains and other parts of China. The gorges of the Yangtze not only hinder navigation between these divisions, but are too narrow for roadways. Ten per cent of the junks attempting to go up the gorges are lost.⁸ 3. The high mountains and plateaus of western Sze-chuan, practically uninhabited, except in a few isolated inter-mountain valleys, and, except in minerals, making no contribution to China's wealth. A fourth isolated basin with rich soils is found in the upper course of the Han River, between the two high ranges of Tsin-ling and Ta-pa-shan.

Climate.—The climate of this central section is milder in temperature, and has a greater rainfall than the northern provinces. Terraced cultivation is, therefore, common. Rice is the chief food crop, while cotton, tea and silk come to be very important. Two to five crops are grown yearly where one crop is the rule in the north. The eastern provinces more resemble in the summer and winter changes of climate the northern provinces. In the mountain-protected Red Basin of Sze-chuan, the climate is distinctly sub-tropical. Frosts are unknown in the valleys. Fogs and cloud are so usual that the saying has become common that when the sun shines in Sze-chuan the dogs bark.⁹

Agriculture.—The Red Basin and the alluvial plains are both important agricultural sections. Both sections raise practically the same crops, rice being the staple. Tea, cotton and silk are also very important. Sugar, oranges and other sub-tropical products are raised in the Red Basin, as well as in the eastern provinces. In the mountains of the far west herds of sheep, goats and yak are found, while buffaloes and ponies are on the lower lands.

The Red Basin of Sze-chuan is a region of exceedingly fertile soil and a dense population, isolated from the rest of the country, and 1,500 miles in the interior of China. Containing an area of about 70,000 sq. miles of red sandstone, from which it derives its name, it is an anciently filled lake basin, which has been elevated and dissected by streams into a succession of steep slopes, deep

⁸ Manifold, C. C. "Recent Exploration and Economic Development in Central and Western China." *The Geographical Journal*, Vol. 23, p. 286.

⁹ Little, A., "The Far East," pp. 72, 123.

ravines and flat-topped hills. These hills are terraced to their very summits, and the fertile soil, abundant rains and mild climate produce several crops per year.

While all the basin is extremely fertile and to the patient Chinese yields abundant crops, the northwest corner contains one of the most remarkably fertile agricultural sections in the world. This is the plain of Cheng-tu, a drained and level lake basin, containing an area of about 2,800 sq. miles, but supporting a population of between 4,000,000 and 5,000,000 people—from 1,800 to 2,000 per sq. mile. A remarkable system of irrigation, begun 250 years, B.C., takes the turbid and turbulent waters of the Min River, spreads them over the plain in an intricate network of canals, and furnishes abundant water for irrigation and soil fertilization at the same time that it dissipates the otherwise destructive flood waters. From five to seven crops are said to be grown each year on this small area.¹⁰

People.—The population of Sze-chuan is about 60,000,000, a great part of whom are in the Red Basin, making this region one of the most densely populated regions in the world. Over-population results in appalling poverty, and there is considerable migration to the less densely inhabited provinces to the south.

In spite of its isolation, the people of Sze-chuan are progressive, quick to adopt western ways and ideas. Its capital, Cheng-tu, possesses many fine schools and public buildings, and is rapidly introducing modern improvements.¹¹

Southern China—Surface.—Except for the narrow valley bottoms and small deltas of its streams southern China is uniformly a high, dissected plateau and mountainous region. As here defined, it includes all the broad plateau south of the main Yangtze Valley, the southwestern province of Yun-nan, and the basin of the Si Kiang. Highest and most rugged in western Yun-nan, which is a part of the great Tibetan plateau, it maintains a general altitude from the base of this plateau to the ocean of from 2,000 to 5,000 feet. A few low passes allow communication between the Si-Kiang Valley, and the Yangtze, the most important of which, historically, the Mei-ling or Plum Tree Pass, north of Canton, is but 1,000 feet in altitude. One hundred miles east of this is a second

¹⁰ Ross, E. A., "The Changing Chinese," p. 302.

¹¹ Ross, E. A. *Ibid.*, p. 303.

pass, through which water connection between the two river systems is maintained by a short canal, and through which will go the proposed railroad from Han-kow to Canton.

Isolated in this mountainous region from the outside world and from each other, the inhabitants of southern China, except in the open and accessible region about Canton, are among the rudest and least educated in China. Here will be found many of the aboriginal Chinese people, maintaining their old customs, violently opposed to governmental control, turbulent, anti-foreign in feeling, constantly fomenting revolution and strife. Here the Tai-ping rebellion had its origin, and again and again these southern provinces have revolted against Manchu rule and foreign influences.

Climate.—Southern China, on account of its altitude, has a cool, sub-tropical climate. Winter frosts occur in practically the entire area, snow sometimes falling, though rarely, even in Canton, within the tropics. But winters are everywhere mild, even in the cooler sections of the west, while the influence of the sea gives the eastern provinces a still more equable climate, with tropical summers. Rainfall is abundant, falling throughout the year, but principally during the summer monsoons. Along the coast the annual average is eighty inches and over, decreasing to the west to forty inches and less.

Agriculture.—Adapted climatically for the growing of a wide range of temperate and sub-tropical crops, agriculture flourishes in the valley bottoms, and extensive hillside terracing has partly overcome the disadvantages of rugged surface. Most of the provinces, however, with difficulty produce food for their own people and this lack of agricultural resources has resulted in relatively sparse populations in many of the southern provinces. Kwang-si is the least densely populated province of China, about sixty-six to the square mile. On the other hand, Fokien, in spite of its inaccessible mountains, maintains a very dense population because of its rich soils, heavy rainfall and elaborate hillside terracing.

Rice is everywhere the most important crop, both east and west, and wheat, barley, maize, opium, tea, sugar cane, tobacco, silk, spices and fruits are almost universally grown. Tea, silk and cotton are grown most abundantly in the east; while opium, with grains, is the leading crop in the west. Grazing of ponies, mules, cattle and sheep is largely carried on in the western provinces,

which are adapted to agriculture only in a few small and isolated valleys.

Forest products and timber constitute an important source of wealth in the mountainous provinces between the Yangtze and Si-Kiang and in Yun-nan, for here preserved in the distant or difficultly accessible mountains, are practically all the forests that are left in China. Great rafts are floated down the rivers to Canton, Shanghai and Foo-chow. The forests are rapidly disappearing, and it is a matter of but a short time when these last remnants will have disappeared.

Agriculture must remain at a great disadvantage in southern China, although undoubtedly the western provinces, especially Yun-nan, are capable of great improvement. Emigration from other crowded provinces, especially Sze-chuan, to this region, is already taking place. In the east, however, especially in Fokien and Kwang-tung, the land is unable to support its over-crowded population, and emigrations in large numbers are taking place to the Straits Settlements and elsewhere.

Mineral Resources.—Lack of detailed information makes an account of the mineral resources of China unsatisfactory. Except in a few localities, trustworthy investigation of mineral deposits has not been made. That China is immensely rich in minerals, however, can be asserted with confidence. Its geologic history—the formation of its ancient rocks and their transformation into mountains—furnished the conditions favoring mineral deposition, while subsequent denudation and dissection of the mountain masses have made them accessible. There is no province in China that does not possess valuable minerals. Coal, iron and copper—the three minerals of greatest economic value to a modern nation—are especially abundant, while the minor metals—tin, lead, zinc, antimony, mercury, gold and silver—are known to occur in considerable quantities. Scientific surveys are almost sure to reveal mineral deposits now unknown even to the Chinese. The Chinese themselves have long mined their minerals in crude and primitive ways, but no attempt has been made to exploit the resources, even for supplying their own immediate needs. Although a coal and iron country, China is a large importer of both minerals, her exports of coal in 1905 being less than one per cent of her imports, and of iron, less than one-sixth of her imports. Copper also is imported to a considerable extent.

Coal.—Coal is found in varying amounts and qualities in all of the eighteen provinces, but the largest field is in northern China, the Shan-si field, occupying the province of that name, but extending into the neighboring provinces of Ho-nan, Chi-li, Shen-si, and even to Kan-su. Like most of the known coal deposits of China, this field is in carboniferous strata, the great coal-bearing formation practically of all the large coal fields of the world.

The oft-quoted estimates of Richthofen give this field an area of 30,000 sq. miles, consisting of beds twenty to thirty-six feet in thickness, the eastern half of anthracite coal, the western of bituminous, extending in horizontal strata across the Shen-si plateau, "sufficient to supply the whole world for thousands of years." According to these estimates, the anthracite deposits of Shan-si would be infinitely larger than those of Pennsylvania. Bailey Willis,¹² of the United States Geological Survey, however, in more recent researches in this region, raises the question of the horizontality of these coal-bearing rocks. If folded, as his observations indicate, the coal measures would occur only in "more or less restricted synclines" or down folds of the rock, somewhat as the coal occurs in eastern Pennsylvania, and the amount of coal estimated by Richthofen, on the basis of the beds being level and undisturbed, would be very greatly reduced. Until further investigations are made, the amount of coal must remain unknown. Though very large they are probably much less than originally estimated.

Upraised from 2,000 to 3,000 feet, these coal measures outcrop around the eastern edge of the Shan-si plateau, allowing mining into the side of the plateau, and furnishing easy means of transportation to and across the plains at its base. Two railroads already extend from the main Pekin-Hankow Railroad westward into this field—one to central Shen-si, the other to northern Ho-nan. In 1906, Shan-si produced 3,000,000 tons of coal.¹³

Near Pekin occur several small coal fields, accessible both by railroad and by sea that have been quite extensively worked for several years by modern methods. Coal here is both bituminous and anthracite. These fields produced in 1906 2,200,000 tons of coal. In 1910 the first cargo of coal and coke from one of these fields was shipped to San Francisco in the attempt to create a market for Chinese coal on the western coast of America.

¹² Willis, Bailey. "Research in China." p. 175.

¹³ Estimate by Prof. Drake, Imperial University of Tien-tsin. Quotation in *Scientific American*, vol. 99, p. 286.

The Shan-tung peninsula contains several small coal fields that are now being operated by modern mining methods. Coal here is of rather poor quality, friable and smoky.

Next in importance to the Shan-si coal field are the fields of southern China, centering in Hu-nan. The coal fields of Hu-nan are said to cover 21,000 square miles, and consist of coking and non-coking bituminous and of anthracite. Coal from the numerous native workings and from government coal mines is readily transported by barge to the Yangtze, to Han-kow and, especially the anthracite, to Shanghai. Four to five million tons, mostly anthracite, are reported to be sent from this province to Hupeh annually.¹⁴ In eastern Kiang-si coal is now mined for supplying the government iron works at Han-kow. Coal and coke are taken by railroad from the fields seventy miles westward, to barges on the Siang River, and thence to Han-kow. In quality the coal of this region appears to be much inferior to that of Shan-si, and very much less in amount.

The populous province of Sze-chuan is underlaid by coal. The coal is exposed in the gorges of the Yangtze, and its affluents, where these cut through the cross ranges. It, as well as iron, is largely mined through adits run into the mountain side, in the primitive but effectual Chinese way, and forms the staple fuel of the country.¹⁵ It is used only by the natives, however. Steamers on the Yangtze are supplied with Japanese coal.

Yun-nan, Kwei-chow and Kwang-tung contain scattered coal fields of unknown amounts, as also the hills in southern Ngan-hwei, and, in small amounts, all the other provinces.

Iron.—Like coal, iron is widely distributed, and often occurs closely associated with coal. Shan-si contains abundant deposits in the coal fields, and has long been smelted by the natives in crucibles in open furnaces. This region supplies nearly the whole of north China with the iron required for agriculture and domestic use,¹⁶ and the total amount smelted in the crude Chinese furnaces is probably very large. The coal fields of Shan-si are underlaid with limestone. Thus there are provided in large quantities in this one province the three raw materials necessary for the smelting of iron.

The provinces of Ho-nan and Kiang-si are rich in iron ores in

¹⁴ Broomhall, M., "The Chinese Empire," p. 173.

¹⁵ Little, A., "The Far East," p. 67.

¹⁶ *Encyclopædia Britannica* (1910), article, "China."

close proximity to coal. In southern Ho-nan excellent steel is made and exported, while ore is carried to the government steel works at Han-kow by barge. Already iron ore and pig iron have been shipped from the Han-kow district to the United States, while regular shipments are sent to Japan. The iron ores of this district are made easily accessible because of the navigable Yangtze and its tributaries.

Sze-chuan, Yun-nan, Shan-tung and Kwang-tung likewise are rich in iron, and furnish most of the iron locally used.

Copper and the Minor Metals.—With the exception of iron, the metallic minerals occur most abundantly in the southern plateau, especially in the western half, practically all the metals of economic importance being found here. Very little modern development has yet taken place, but the primitive Chinese methods are producing a considerable quantity. The mineral resources of southern China will probably come to be its greatest source of wealth.

Copper is found to be especially rich in Yun-nan and Kwei-chow, and considerable mining is there done to secure the metal for coining the Chinese "cash." Tin is also abundant and, in spite of primitive mining methods and long distances from the coast, there was exported from China in 1910 over 4,500 long tons of the metal.

Antimony seems to be very abundant in Hu-nan and Kwang-si, and already a considerable export—8,000 tons of the metal—is sent from this section. Mercury is the chief source of revenue for Kwei-chow, which contains probably the richest fields of this metal in the world. Lead and zinc are very common in most of the southern provinces. Silver and gold are widely distributed, although the production of the latter, almost entirely by washing river gravels, is small. On the Han River the flood gravels of each summer are carefully washed for their small content of placer gold brought down from the mountains. The little explored mountains of western Sze-chuan and Yun-nan are thought to contain many and rich mineral deposits.

Non-Metals.—Kaolin deposits have furnished the basis of an important and characteristic Chinese industry. Northeastern Kiang-si contains the largest and best-known deposits, and furnishes material for the pottery industry that has grown up there, supplying the rice bowls that are used everywhere in China. King-to-chen, the center of the industry, at present has one hundred and

sixty furnaces, and employs 160,000 people. Before the Taiping rebellion (1850) a million people were employed.¹⁷

Petroleum and natural gas are found in Sze-chuan. For 2,000 years natural gas has been used to evaporate salt in this province.¹⁸ Salt is a very important product in many parts of China. Along the coast it is evaporated from sea water; in Shan-si, from a salt lake, while in Sze-chuan and Yun-nan it is secured from brine wells.

China is now, and for forty centuries has been, an agricultural nation. Much of her mountainous surface, naturally ill-adapted to cultivation, has been transformed by a stupendous amount of human labor into food-producing, fertile fields. To the minerals hoarded in these mountains she has paid little attention, never dreaming of the vast potential wealth locked far beneath her soils, awaiting but the magic touch of modern industry to release it. To her present agricultural industries these resources of coal and metals, once developed, will supply new raw materials and mechanical power, which ultimately will make possible, in the hands of her enormous population, the development of a manufacturing industry of almost inconceivable magnitude, and will lay the foundation of a world-wide commerce.

¹⁷ Richards, "Comprehensive Geography of the Chinese Empire," p. 144.

¹⁸ King, F. H., "Farmers of Forty Centuries," p. 138.

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